

CLAIMS

1. A method of cutting a flexible log comprising:
 - depositing a log of substrate in a pocket;
 - the pocket comprising an open end and a closed end;
 - the pocket comprising a first planar surface, a second planar surface, and a concave surface between the planar surfaces; wherein the second planar surface is larger than the first planar surface, and wherein the concave surface forms the closed end;
 - dividing the log into a plurality of rolls with a cutting force; and
 - holding the rolls in the pocket such that the cutting force is counterbalanced by the pocket.
2. The method of claim 1, wherein the dividing comprises contacting the log with a plurality of cutting devices.
3. The method of claim 2, wherein the cutting devices are circular saw blades.
4. The method of claim 2, wherein the pocket further comprises channels through which the cutting devices can pass.
5. The method of claim 1, wherein the holding comprises removing the cutting devices from the substrate once the log has been divided into rolls.
6. The method of claim 1, wherein the pocket further comprises a width defined by the distance between the first and second planar surfaces; wherein the width is greater than the diameter of the log.
7. The method of claim 6, wherein holding comprises containing the log within the pocket without covering the open end.
8. The method of claim 1, wherein the holding comprises counterbalancing the cutting force with a reaction force from the first planar surface and the concave surface.

9. The method of claim 1, wherein the first planar surface has a width less than about 25 mm and a length between 50 mm and 360 mm.

10. The method of claim 1, wherein the second planar surface has a width less than about 155 mm and a length between 50 mm and 360 mm.

5 11. The method of claim 1, wherein the concave surface has a radius of curvature between 12 mm and 130 mm.

12. The method of claim 1, wherein the distance between the planar surfaces is between 50 mm and 250 mm.

13. The method of claim 1, wherein the pocket is mounted with a plurality of other pockets on a rotating sprocket, the rotating sprocket having a horizontal axis.

14. The method of claim 13, wherein the depositing occurs when the pocket is at an angle between 30-degrees and 80-degrees from the horizontal axis.

15. The method of claim 13, wherein the depositing occurs when the pocket is at an angle of 45-degrees from the horizontal axis.

16. The method of claim 13, wherein the deposited log is supported by the second planar surface and the concave surface.

17. The method of claim 13, further comprising rotating the deposited log to a cutting area.

18. The method of claim 17, wherein the log in the cutting area is between 60-degrees and 110-degrees from the horizontal axis.

19. The method of claim 17, wherein the log in the cutting area is between 75-degrees and 90-degrees from the horizontal axis.

20. The method of claim 17, wherein the dividing comprises pivoting a plurality of saw blades into the log.

21. The method of claim 20, wherein the cutting force comprises an impact force of the blades on the substrate and a friction force between the blades and the substrate.

22. The method of claim 21, wherein the holding comprises counterbalancing the cutting force with a reaction force from the first planar surface and the concave surface.

23. The method of claim 21, wherein the holding comprises removing the saw blades from the pocket once the log has been divided into rolls.

24. The method of claim 23, wherein the removing is complete when the log is between 65-degrees and 115-degrees from the horizontal axis.

25. The method of claim 23, wherein the removing is complete when the log is between 80-degrees and 110-degrees from the horizontal axis.

26. The method of claim 23, wherein the removing is complete when the log is between 85-degrees and 90-degrees from the horizontal axis.

27. The method of claim 13, further comprising rotating the rolls to a collection apparatus.

28. The method of claim 27, wherein the roll is prevented from dropping out of the pocket by a roll retention device.

29. The method of claim 28, wherein the roll retention device is a retention shoe.

30. The method of claim 27, wherein the collection apparatus comprises a diverter.

31. An apparatus for cutting a flexible log comprising:

a cutting device;

a pocket, the pocket comprising

an open end;

a closed end;

a first planar surface;

a second planar surface, wherein the second planar surface is larger than the first planar surface; and

a concave surface between the planar surfaces, wherein the concave surface forms the closed end;

a plurality of channels, the channels situated in the pocket; and

a sprocket, the sprocket supporting the pocket, the sprocket rotating about an axis.

32. The apparatus of claim 31, wherein the distance between the first and second planar surfaces is greater than the diameter of the log.

33. The apparatus of claim 32, wherein the cutting device exerts a force on the log.

34. The apparatus of claim 33, wherein the pocket counterbalances the forces exerted on the log by the cutting device.

35. The apparatus of claim 34, wherein the first planar surface and the concave surface counterbalance the forces exerted on the log by the cutting device.

36. The apparatus of claim 31, wherein the cutting device is configured to pass through the channels.

37. The apparatus of claim 35, wherein the cutting device comprises circular saw blades.

38. The apparatus of claim 31, wherein the first planar surface has a width less than about 25 mm and a length between 50 mm and 360 mm.

39. The apparatus of claim 31, wherein the second planar surface has a width less than about 155 mm and a length between 50 mm and 360 mm.

40. The apparatus of claim 31, wherein the concave surface has a radius of curvature between 12 mm and 130 mm.

5 41. The apparatus of claim 31, wherein the distance between the planar surfaces is between 50 mm and 250 mm.

42. The apparatus of claim 31, wherein the sprocket supports a plurality of pockets.

43. A method of cutting a flexible log comprising:

depositing a log of substrate in a pocket having an open end;

the pocket comprising a first planar surface, a second planar surface, and a concave surface between the planar surfaces; wherein the second planar surface is larger than the first planar surface;

the pocket comprising channels;

the pocket mounted with a plurality of other pockets on a rotating sprocket;

rotating the deposited log to a cutting area;

20 moving a plurality of saw blades into the log, the blades passing through the channels;

dividing the log into a plurality of rolls with a cutting force;

counterbalancing the cutting force with a reaction force from the first planar surface and the concave surface; and

25 removing the saw blades from the pocket once the log has been divided into rolls.

44. A pocket for holding flexible logs comprising:

a base, the base defining a horizontal axis;

an open end;

a closed end;

a first planar surface, the first planar surface having a width less than about 25 mm and a length between 50 mm and 360 mm;

a second planar surface, the second planar surface having a width less than about 155 mm and a length between 50 mm and 360 mm; and

a curved surface, the curved surface having a radius of curvature between 12 mm and 130 mm;

wherein the planar surfaces are at an angle of 60-degrees above the horizontal axis, and wherein the planar surfaces are separated by a distance between 50 mm and 250 mm.

45. A method of cutting a flexible log comprising:

a) rotating a pocket to a delivery position; the pocket mounted on a sprocket having a first horizontal axis; the pocket comprising a first wall, a second wall, and a bottom; the pocket in the delivery position at an angle between 30-degrees and 80-degrees from the first horizontal axis;

b) delivering a log to the pocket at the delivery position, wherein the log is supported by the first wall and the bottom;

c) rotating the pocket and log to a cutting area, the pocket in the cutting area at an angle between 60-degrees and 110-degrees from the first horizontal axis;

d) moving a saw downward to a lowered position to contact the log; the saw comprising a plurality of circular blades; the saw mounted on an arm having a second horizontal axis; the arm moving the saw to the lowered position by pivoting between 5-degrees and 15-degrees below the second horizontal axis;

e) applying a cutting force to the log with the saw such that the log is completely divided;

f) holding the log in the pocket by counterbalancing the cutting force with a reaction force from the second wall and the bottom;

g) moving the saw upward to a raised position when the log is between 80-degrees and 110-degrees from the first horizontal axis, the arm

moving the saw to the raised position by pivoting between 5-degrees and 30-degrees above the second horizontal axis; and

h) rotating the pocket and the log away from the cutting area.

46. A method of cutting an elongate substrate comprising:

5 providing the elongate substrate in a plurality of pockets, the pockets being positioned to support the substrate along its length;

dividing the substrate into a plurality of rolls with a plurality of circular saw blades;

10 exerting an upward vertical force on the rolls while the saw blades are in contact with the rolls; and

counterbalancing the upward vertical force to maintain the rolls in the pockets without the use of an external structure to hold the rolls in the pockets.

47. An apparatus for cutting an elongate substrate comprising:

15 a plurality of pockets, the pockets being positioned to support the substrate along its length;

a plurality of circular saw blades, the saw blades cutting the substrate into a plurality of rolls and exerting an upward vertical force on the rolls while the saw blades are in contact with the rolls; and

20 the pockets being configured to maintain the rolls in the pockets without the use of an external structure to hold the rolls in the pockets.

48. A method of cutting a flexible log comprising:

providing a cutting device, the cutting device comprising a plurality of saw blades and at least one support arm;

25 providing a log of substrate in a pocket; the pocket having a plurality of channels, and the pocket mounted on a rotating sprocket;

simultaneously rotating the sprocket and pivoting the support arm such that the cutting device and the pocket containing the log converge in a cutting area;

dividing the log into a plurality of rolls by passing the saw blades through the channels; and

simultaneously rotating the sprocket and pivoting the support arm such that the cutting device and the pocket containing the log are separated.